Title: Field Trip Frenzy

Brief Overview:

Students will analyze and compare travel information for four different cities based on their historical significance to the American Revolution and the establishment of the United States' government. The students will use this information to choose the most economical field trip. In their final assessment, the students will write a proposal to the PTA informing them of the final field trip destination.

NCTM 2000 Principles for School Mathematics:

Equity: *Excellence in mathematics education requires equity - high expectations and strong support for all students.*

Curriculum: *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*

Teaching: *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*

Learning: *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*

Assessment: *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*

Technology: *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

Content Standards

Number and Operations

Understand numbers, ways of representing numbers, relationships among numbers, and number systems; recognize equivalent representations for the same number and generate them by decomposing and composing numbers; develop understanding of decimals as parts of unit wholes, as locations on number lines, and as divisions of whole numbers.

Understand meaning of operations and how they relate to one another; understand various meanings of multiplication and division; and understand the effects of multiplying and dividing whole numbers.

Compute fluently and make reasonable estimates; develop and use strategies to estimate computations in situations relevant to students' experience; and select appropriate methods and tools for computing with whole numbers from among mental computation, estimate, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tools.

Algebra

Understand patterns, relations, and functions; and represent and analyze patterns and functions, using words, tables, and graphs.

Use mathematical models to represent and understand quantitative relationships; and model problem situations with objects and use presentations such as graphs, tables, and equations to draw conclusions.

Data Analysis and Probability

Formulate questions that can be addressed with data and collect, organize and display relevant data to answer them; and represents data using tables and graphs such as: line plots, bar graphs, and line graphs.

Select and use appropriate statistical methods to analyze data; describe the shape and important features of a set of data and compare related data sets, with an emphasis on how data are distributed; use measure of center, focusing on the median and understand what each does and does not indicate about the data set; and compare different representations of the same data and evaluate how well each representation shows important aspects of the data.

Develop and evaluate inferences and predictions that are based on data; and propose and justify conclusions and predictions that are based on data.

Process Standards

Problem Solving

Instructional programs from pre-kindergarten through grade 12 should enable all students to build new mathematical knowledge through problem solving; solve problems that arise in mathematics and in other contexts; apply and adapt a variety of appropriate strategies to solve problems; and monitor and reflect on the process of mathematical problem solving.

Reasoning and Proof

Instructional programs from pre-kindergarten through grade 12 should enable all students to recognize reasoning and proof as fundamental aspects of mathematics; make and investigate mathematical conjectures; develop and evaluate mathematical arguments and proofs; and select and use various types of reasoning and methods of proof.

Communication

Instructional programs from pre-kindergarten through grade 12 should enable all students to organize and consolidate their mathematical thinking through communication; communicate their mathematical thinking coherently and clearly to peers, teachers, and others; analyze and evaluate the mathematical thinking and strategies of others; and the language of mathematics to express mathematical ideas precisely.

Connections

Instructional programs from pre-kindergarten through grade 12 should enable all students to recognize and use connections among mathematical ideas; understand how mathematical ideas interconnect and build on one another to produce a coherent whole; and recognize and apply mathematics in context outside of mathematics.

Representation

Instructional programs from pre-kindergarten through grade 12 should enable all students to create and use representations to organize, record, and communicate mathematical ideas; select, apply, and translate among mathematical representations to solve problems; and use representations to model and interpret physical, social, and mathematical phenomena.

Grade/Level:

Grades 4-5

Duration/Length:

Five 60-minute class periods.

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

Writing to inform
Multiplying whole numbers
Comparing whole numbers
Writing a number sentence
Creating a single bar graph

Student Outcomes:

Students will:

- Identify and explain place value through millions.
- Identify and explain place value through hundredths.
- Round whole numbers and decimals.
- Write whole numbers and decimals in standard, expanded, and word form.
- Create double bar graph.
- Estimate multiplication of whole number and decimals.

Materials/Resources/Printed Materials:

Overhead
Overhead transparencies of Teacher Resource Sheets # 1, 2 and 5
Copies of all Student Resource Sheets
Student copies of Performance Assessment packet "Field Trip Frenzy"
Colored pencils

Development/Procedures:

Day 1

In small groups have students brainstorm a list of major cities that were established in the thirteen colonies. Create a class list of cities on the chalkboard.

Place Teacher Resource Sheet # 1, map of The 13 Colonies, on the overhead. Ask students to use the map to identify and explain physical features that were common to many of the cities from their list. (i.e.: located on waterways)

Ask students: "Based on what you have learned in Social Studies and the map of the 13 colonies, determine which four cities may have been most important in the establishment of our nation." (Washington, DC while not located on the map, became the nation's capital. This should come out in discussion based on the students' knowledge from Social Studies.)

Display Teacher Resource Sheet # 2, "Field Trip Frenzy" unit Introduction, on the overhead and read as a class.

Ask students to predict the population of New York City and Boston for the years 1790 and 2002.

Hand out Student Resource Sheet # 1, "PTA Budget". Read the PTA budget. Call on students to tell the value of several randomly called digits. (What digit is in the hundreds place? etc.) Guide the students with the place value practice. Have the students use the place value mat to expand their standard numbers before recording their answers on the worksheet. Answer key is on Teacher Resource Sheet # 3.

When students are comfortable with identifying the place value of specific digits, have them complete Student Resource Sheet # 2, "Poppin' Populations", Activity 1, Steps A and B. Answer key is on Teacher Resource Sheet # 3.

Use the answer key Teacher Resource Sheet # 3, Answer Key – Day 1 to correct student work for Student Resource Sheet # 1, "PTA Budget" and Student Resource Sheet # 2, "Poppin' Populations".

Day 2

Tell the students that today they will be looking at travel information to New York City and Boston. Distribute Student Resource Sheet # 3, "On the Road". Ask students to tell the value of several randomly called digits (whole number and decimal). What digit is in the hundreds place? etc.) Guide the students through place value practice with decimals using the decimal place value mat. In Step B, discuss with the students the place value digit that determines the greater number. Have them underline the digit. Answer key is on Teacher Resource Sheet # 4.

Have students complete Student Resource Sheet # 4, "Guzzling Gas", independently. Answers may be found on Teacher Resource Sheet # 4.

Use the answer keys to correct student work as appropriate.

Day 3

Today the students will be calculating hotel costs. Distribute Student Resource Sheet # 5, "NYC Vs Boston". Assign 10 minutes to complete Activity 1, Steps A-C. Students will work independently. Answers may be found on Teacher Resource Sheet # 6.

Check Activity 1 together. Instruct students to record correct answers if they have errors. Place Teacher Resource Sheet # 5, Transparency of Bar Graph Grid, on the overhead. Discuss as a class the expenses calculated over the past lessons. In order to have multiple expenses to compare between New York City and Boston, inform the students of the cost for a tour guide for each city.

New York City = $100.00
Boston = $85.00

Determine with the class the range of rounded expenses for each trip is $85.00 to $517.00. Discuss possible monetary scales to use along the y-axis. $50.00 intervals are ideal. Determine as a class a label for the y-axis.

Discuss categories to be compared along the x-axis and label. Categories: Tour guides, Lodging, and Gasoline.

Assign a color code for each city and place on the graph as a key.

Have the class draw the bars to compare the cost of the Tour Guides. Then instruct the students to display the data by drawing bars for lodging and gasoline. Use teacher judgment to determine if continued group guidance is needed. A sample bar graph can be found on Teacher Resource Sheet # 6.

Use the answer keys to correct student work as appropriate.

Day 4

Distribute the performance assessment "Field Trip Frenzy." Students will independently complete Activities 1-4 on the performance assessment. Remind students to stop at the end of page 8.

Collect "Field Trip Frenzy" packets at the end of the class period. An answer key has been provided.

Day 5

Distribute the performance assessment "Field Trip Frenzy." Read aloud Activity 5, Writing Prompt.

Have students complete Activity 5, Steps A – D independently. Allow the entire class period to complete.

Use the answer key Teacher Resource Sheet # 7, Answer Key for Field Trip Frenzy Student Performance Assessment, to correct student work.

Performance Assessment:

The assessment for this unit will be on going. The students will be assessed on class participation, completion instructional activities, and the performance assessment packet.

Extension/Follow Up:

Students present their proposals to the class. The class will vote on field trip choices based on the proposals. The results of the voting can be graphed.
Students can develop daily schedules for the field trip.

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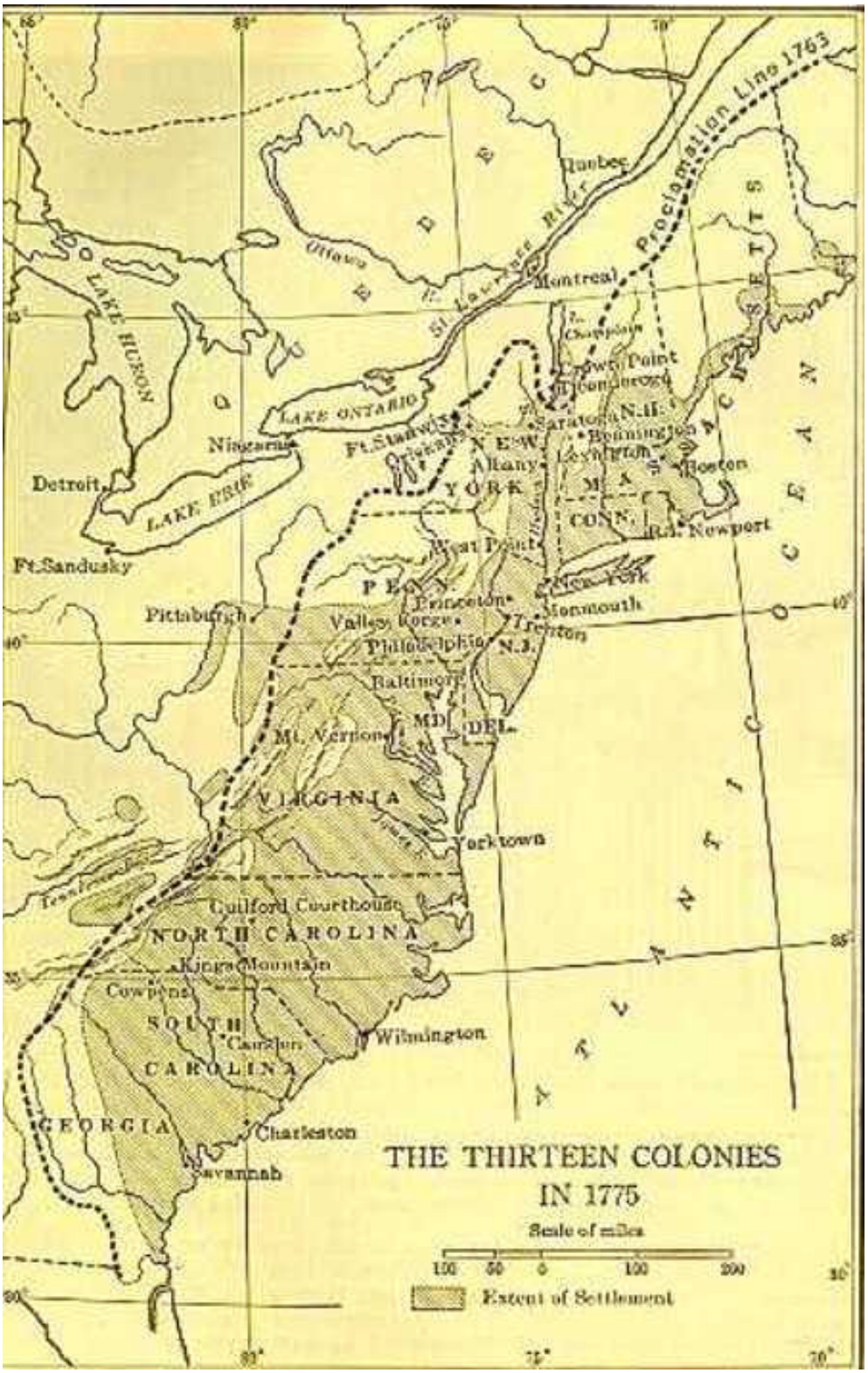
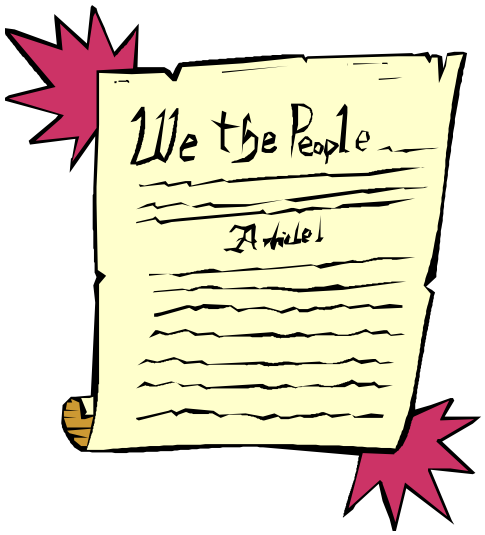
The 13 Colonies



Field Trip Frenzy

In our class we have studied the early origins of our country. The PTA has offered to fund a field trip to expand our knowledge about our government. They have chosen four major cities that were important in the establishment of the United States of America. Those cities are Boston, MA, New York, NY, Philadelphia, PA and Washington, DC. The PTA has asked the fifth grade students to choose a field trip destination and write a proposal justifying that choice.

There are many factors to consider when choosing a destination for our trip. We will determine cities' populations and analyze the trip's cost based on distance from our school, fuel prices, and lodging.



PTA's Budget

Activity 1: Last night PTA presented its budget plan to the school board.

Field Trips	Assemblies	Fund Raisers	Teacher Reimbursement	School Materials
$36,511	$11,004	$1,001,239	$6,981	$36,505

Step A
Complete the table.

Standard Form	Word Name	Expanded Form
	Thirty-six thousand five hundred eleven	
11,004		
		1,000,000 + 1,000 + 200 + 30 + 9
	Six thousand, nine hundred eighty one	
36,505		

Step B
In standard form, order the PTA's accounts from least to greatest.

Least _____

_____

_____

_____

Greatest _____

Step C

Using the PTA's budget plan, round each of the six accounts to their highest place value.

Accounts	Field Trips	Assemblies	Fund Raisers	Teacher Reimburse-ment	School Materials
Actual Costs	$36,511	$11,004	$1,001,239	$6,981	$36,505
Rounded Costs					

Place Value Mat

Millions			Thousands					
Hundreds	**Tens**	**Ones**	**Hundreds**	**Tens**	**Ones**	**Hundreds**	**Tens**	**Ones**

Student Resource Sheet # 2

Poppin' Populations

Activity 1: In order to help make your decision the PTA has researched the present population of New York City and Boston and during 1790.

City	Population in 1790	Population in 2002
New York City	33,111	8,008,278
Boston	44,865	589,141

Step A
Using the information from the table, write each city's highest place value in word form.

	1790	2002
New York City	_____	_____
Boston	_____	_____

Step B
When analyzing information it is more efficient to use numbers that have been rounded. Now round both populations for each city to the highest place value.

City	Population in 1790 rounded to the highest place value	Population in 2002 rounded to the highest place value
New York City		
Boston		

Student Activities
Answer Keys
Day 1

PTA Budget

Activity 1

Step A	Standard Form	Word Name		Expanded Form	
	36,511	Thirty-six thousand, five hundred eleven		30,000+6,000+500+10+1	
	11,004	Eleven thousand, four		10,000+1,000+4	
	1,001,239	One million, one thousand, two hundred thirty-nine		1,000,000+1,000+200+30+9	
	6,981	Six thousand, nine hundred eighty-one		6,000+900+80+1	
Step B	Least	6,981			
		11,004			
		36,505			
		36,511			
	Greatest	1,001,239			
Step C	Field Trips	Assemblies	Fund Raisers	Teacher Reimburse	School Materials
Rounded Cost	40,000	10,000	1,000,000	7,000	40,000

Poppin' Population

Activity 1

Step A		1790	2002
	NYC	ten thousand	one million
	Boston	ten thousand	one hundred thousand
Step B		1790	2002
	NYC	30,000	8,000,000
	Boston	40,000	600,000

On the Road

Activity 1: PTA has researched the distance to nearest tenth of a mile for the following destinations.

City	Miles
New York City	181.75
Boston	394.44

Step A
Complete the table.

Standard Form	Word Name	Expanded Form
	One hundred eighty one and seventy five hundredths	
		300 + 90 + 4 + 0.4 + 0.04

Step B

1. Insert the < or > symbol to explain the relationship between the two distances.

181.75 ◯ 394.44

2. Underline the digit that helped us make our decision.

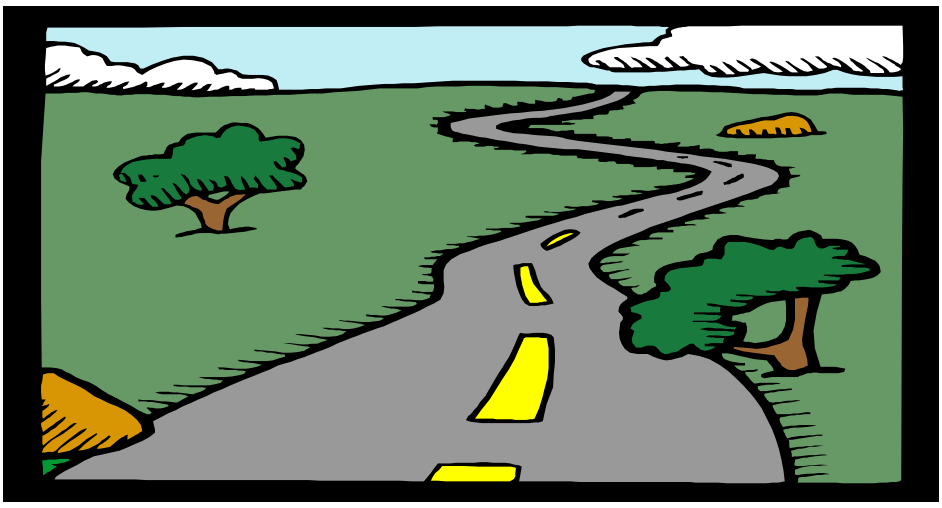
Step C

Steps to Rounding

Step 1	Step 2	Step 3	Step 4
Underline the place to which you want to round	Look to the digit to the **right**.	If the number is 5 or greater, **round UP**! If the number is less than 5, it stays the **SAME**!	Change the numbers **behind** the rounded place value to **0**.
5.09	5.09	5.09	5.10

Using "The Steps to Rounding" chart round the mileage to each city to the nearest mile.

City	Miles	Rounded Mileage
New York City	181.75	
Boston	394.44	



Place Value Mat

Hundreds	Tens	Ones	.	Tenths	Hundredths

Guzzling Gas

Activity 1: The PTA has also calculated the cost of gasoline for the trips. $1.31 per gallon is the going rate.

Step A
Round the price of gas per gallon to the nearest tenth. (Remember to use your rounding steps.) _____

Step B
The actual cost of gasoline for the trips can be found on the chart below. Round the cost of gasoline to the nearest whole dollar.

City	ACTUAL cost of gasoline for the trips	ROUNDED cost of gasoline for the trips
New York City	$238.09	
Boston	$516.72	

Step C
Using what you know about place value, write an explanation to the PTA stating which trip's fuel is most expensive.

_____

_____

_____

_____

_____

_____

Student Activities
Answer Keys
Day 2

On the Road

Activity 1

Step A

Standard Form	Word Name	Expanded Form
181.75	One hundred eighty-one and seventy-five hundredths	100+80+1+0.7+0.05
394.44	Three hundred ninety-four and forty-four hundredths	300+90+4+0.4+0.04

Step B < The 3 in the hundreds place should be underlined

Step C Rounded Mileage NYC = 181 miles Boston = 394 miles

Guzzling Gas

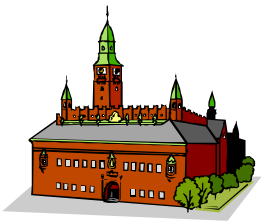
Activity 1

Step A $1.30

Step B Rounded Costs
NYC = $238.00
Boston = $517.00

Step C Student explanation should state that $517.00 is the most expensive and compare the digits in the hundreds place.

N Y C vs. Boston



Activity 1: Now we will be calculating the hotel cost for our class.

Step A
There are 24 students in our class. Each hotel room will accommodate four students. Write a number sentence to show how many rooms our class will need.

_____

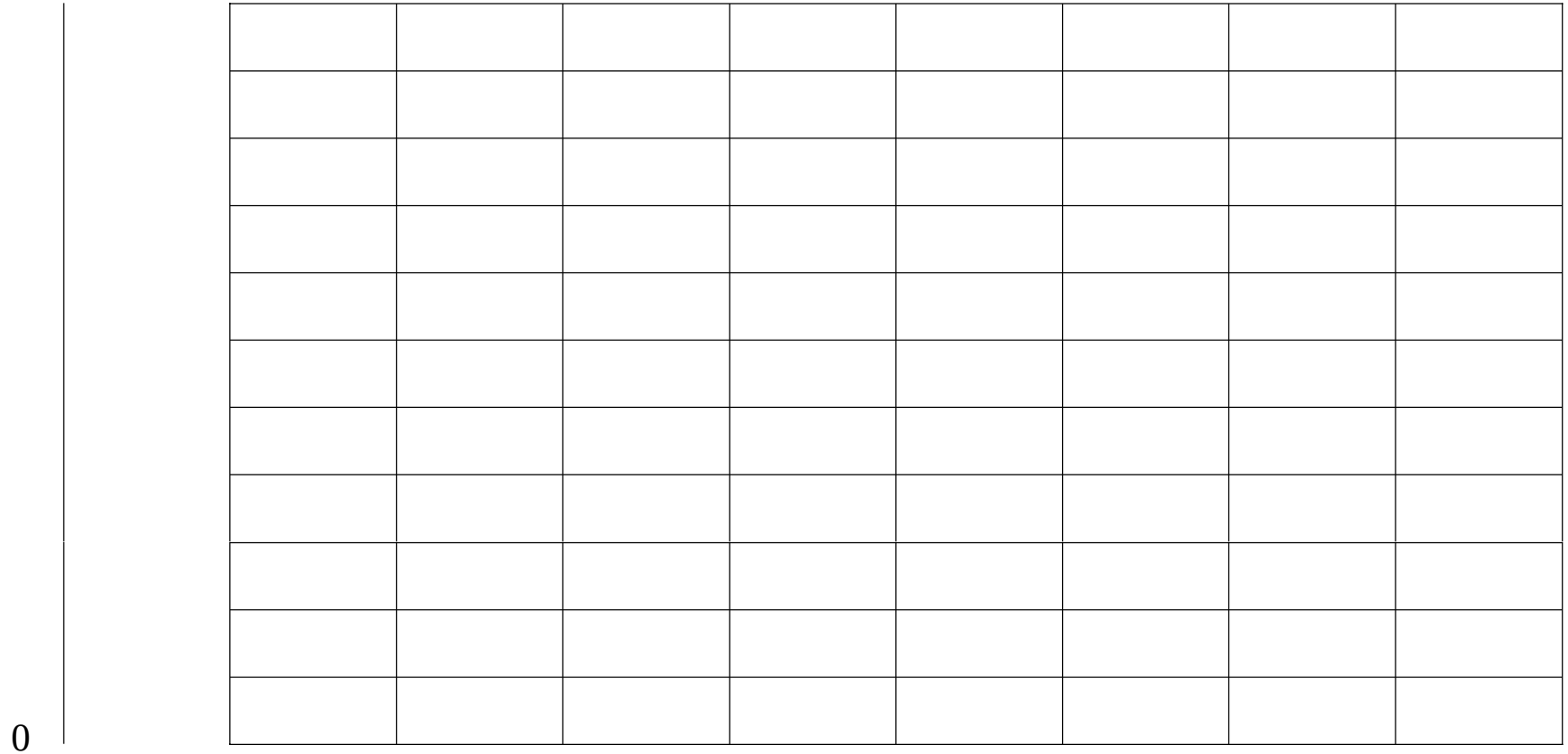
Step B
The chart below shows the actual cost of hotel rooms per night. Round the hotel cost to the nearest dollar.

City	ACTUAL Hotel Cost	ROUNDED Hotel cost
New York City	$49.95	
Boston	$34.95	

Step C
Estimate the hotel cost for the class for each city using your information from Steps A and B.

New York City	Boston

Activity 2: With your class, construct a double bar graph comparing the expenses for New York and Boston.



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Student Activities
Answer Keys
Day 3

NYC vs. Boston

Activity 1

Step A $24 \div 4 = 6$

Step B Rounded hotel costs

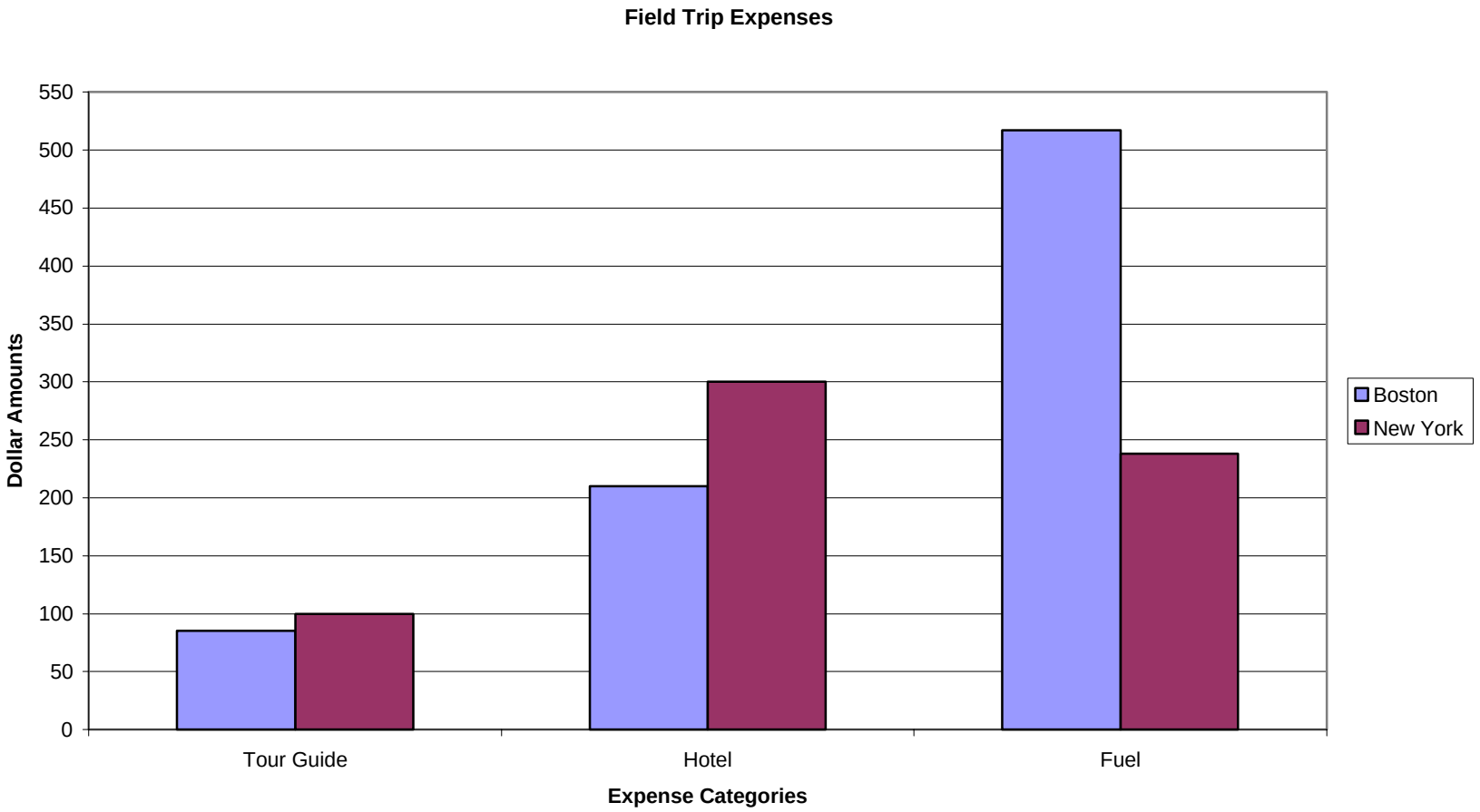
NYC = $50.00

Boston = $35.00

Step C Estimated hotel costs for class

NYC	Boston
$50.00	$35.00
x 6	x 6
$300.00	$210.00

Graph – See exemplary answer on next page


Field Trip Expenses
Dollar Amounts
550
500
450
400
350
300
250
200
150
100
50
0
Tour Guide
Hotel
Fuel
Expense Categories
Boston
New York

Field Trip Frenzy

Now that we have researched Boston and New York City, the PTA has decided those cities are too expensive for us to visit. We will need to choose between Philadelphia and Washington, DC. As we discussed earlier, two cities that are very important to our nation are Philadelphia, PA and Washington, DC. Philadelphia was the city where our founding fathers drafted our current system of government and Washington, D.C. was later established as the capital of our country.

You will now need to consider the same factors we analyzed when we compared Boston and New York City. After you have analyzed the information on each city, you will determine which trip is the most economical for the PTA to fund. Finally, you will write a proposal to the PTA informing them of the most economical choice for our field trip.

Activity 1: In order to help make your decision the PTA has researched the present population of Philadelphia and Washington, DC and during 1790.

City	Population in 1790	Population in 2002
Philadelphia	54,388	1,517,550
Washington, DC	n/a	572,059

Step A
When analyzing information it is more efficient to use numbers that have been rounded. Now round both populations for each city to the highest place value.

City	Population in 1790 rounded to the highest place value	Population in 2002 rounded to the highest place value
Philadelphia		
Washington, DC		

Step B
Using the information from the table and what you know about place value, describe how the population in each city has changed over time.

_____

_____

_____

_____

_____

_____

_____

Go On

Activity 2: The PTA has researched the distance and fuel cost for the following destinations.

City	Miles	Fuel Cost
Philadelphia	96.17	$125.98
Washington, DC	54.8	$71.24

Step A

The PTA wrote the numbers in expanded form. Look at each expanded number. Are they each written correctly? Explain your answer.

Philadelphia = 90 + 6 + 0.1 + 0.07

Washington, DC = 50 + 4 + 0.08

_____

_____

_____

_____

_____

Step B

So that it will be easier to compare data in your proposal, round the fuel costs to the nearest whole dollar.

	Rounded Cost
Philadelphia	_____
Washington, DC	_____

Step C

From Step B, explain how you determined the rounded fuel costs.

Activity 3

Only 20 students have returned permission forms to go on our field trip. Each hotel room will accommodate 4 students. Use the hotel costs below to estimate the total hotel cost for each city.

Step A
Write a number sentence to show how many rooms our class will need.

_____

City	ACTUAL hotel cost
Philadelphia	$79.95
Washington, DC	$89.95

Step B
Use the work space below to estimate the hotel costs.

Philadelphia	Washington, DC

Go On

Activity 4

Step A

In order to prepare the data for you proposal to the PTA, organize the expenses you have calculated onto the chart below. The PTA has provided the cost for tour guides.

Travel Expenses

City	Tour Guides	Rounded Fuel Cost	Estimated Hotel Cost
Philadelphia	$90.00		
Washington, DC	$95.00		

Step B

Use the cost information from the chart you completed in Step A to create a double bar graph on the grid provided on the next page.

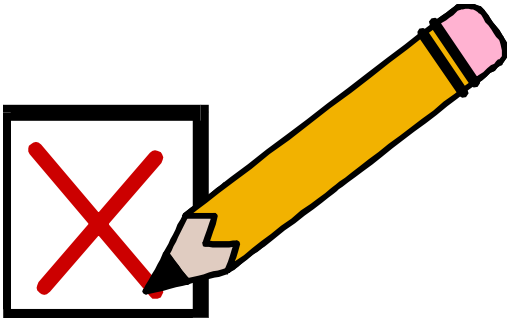
Go On

0

Go On

Step C
Use the checklist below to self-evaluate your graph. Make any corrections you feel are necessary.

Double Bar Graph Checklist	
Check when complete	**Criteria to be checked on your graph.**
	Title the bar graph
	Label the axes
	Select an appropriate scale for the y-axis
	Think about whether or not using a break is appropriate
	Choose two colors to represent the two types of bars
	Plan the spacing of the bars for the data. The data for each category should touch and a space is inserted between each new category
	Use the Travel Expenses chart to create the bars
	Create a key



Activity 5
Writing Prompt

Now that you have completed a comparison of costs for field trips to Philadelphia and Washington, DC it is time to select the field trip for our class to take. Philadelphia was the city where our founding fathers drafted our current system of government and Washington, D.C. was later established as the capital of our country.

After you have analyzed the information on each city you will determine which trip is the most economical for the PTA to fund. Finally, you will write a proposal to the PTA informing them of the most economical choice for our field trip. In your proposal you should include the location of the trip, expenses, and support from the data for your choice.

Step A
Tell which city you have chosen for our class field trip. _____

Step B
Use the chart below to organize your reasons for your destination choice.

Support for Field Trip Proposal

Reasons to visit _____	**Reasons NOT to visit _____**

Step C
Now you are ready to write your field trip proposal.

Field Trip Proposal

Go On

Go On

Step D
Use the checklist below to edit your proposal.

Editing Criteria for Field Trip Proposal	
Self Check	**Criteria**
	Uses correct format
	Addresses the appropriate audience
	Uses Math vocabulary
	Clearly identifies the field trip choice
	Gives clear reasons for choice based on data
	CUPS

Field Trip Frenzy

Performance Assessment
Answer Key

Activity 1
Step A

City	Population 1790	Population 2002
Philadelphia	50,000	2,000,000
Washington, DC	n/a	600,000

Activity 1
Step B

The answer must include comparison of the past populations to the present using place value.

*See Math Writing Rubric

Score	Math Writing Rubric
3	Accomplishes purpose of question. Math communication is clear.
2	Partially accomplishes purpose of question. Math communication lacks total clarity.
1	Shows limited understanding of question. Math communication is not clear.

Activity 2
Step A

The answer must include 50 + 4 + 0.8 for the expanded form for the distance to Washington, DC.

*See Math Writing Rubric

Activity 2
Step B

	Rounded Cost
Philadelphia	$126.00
Washington, DC	$71.00

Activity 2
Step C

The answer must refer to the place value to the right of the highest place value to determine the rounded fuel costs.

*See Math Writing Rubric.

Activity 3
Step A

20 . 4 = 5

Activity 3
Step B

Answers must use rounded numbers rather actual costs.

Philly	**DC**
$80	$90
x 5	x 5
$400	$450

Activity 4
Step A

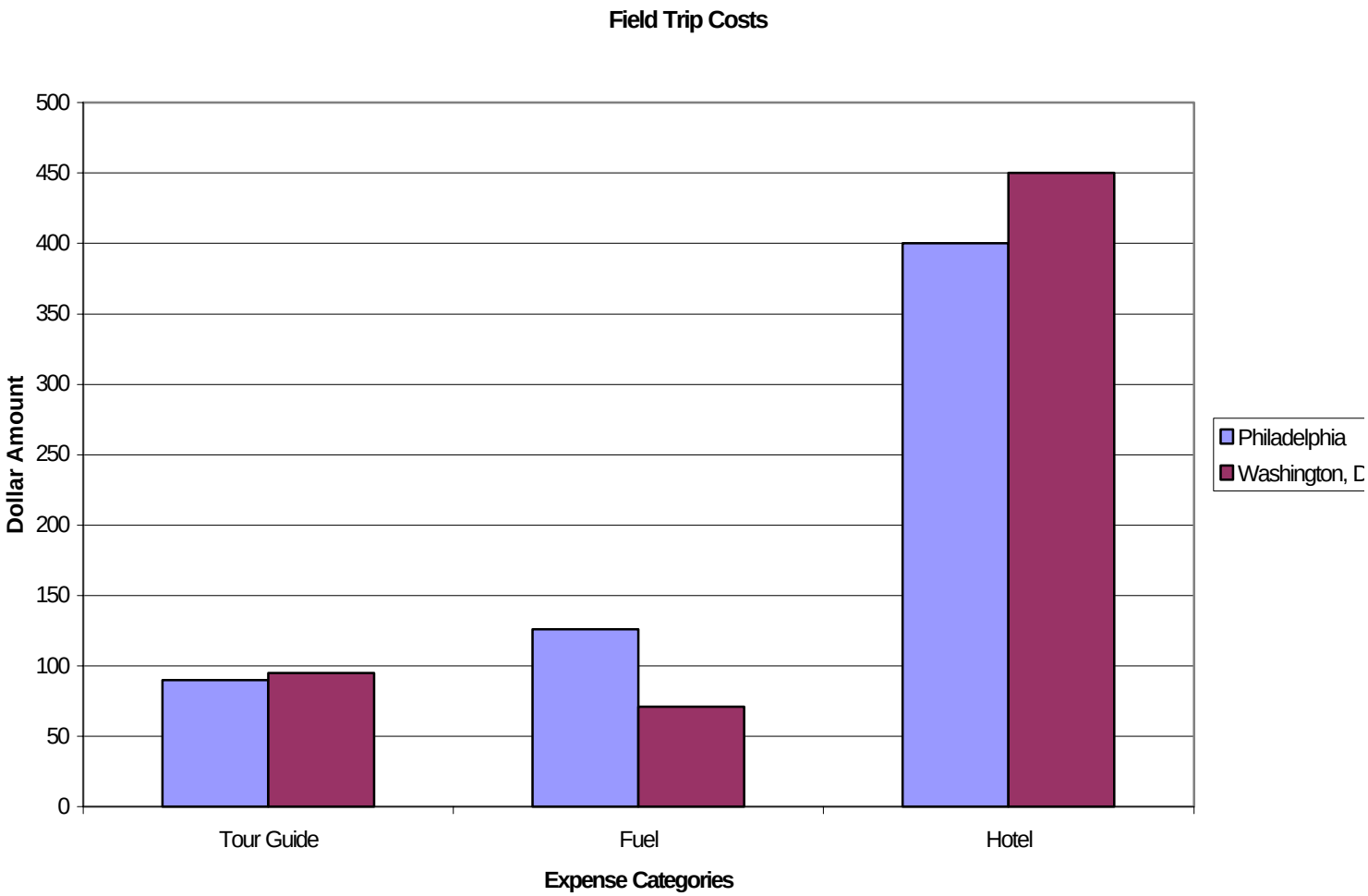
City	Tour Guides	Rounded Fuel Costs	Rounded Hotel Costs
Philly	$90	$126	$400
DC	$95	$71	$450

Activity 4
Step B

Double Bar Graph Checklist	
Score	**Criteria to be checked on your graph.**
0 1	Title the bar graph
0 1	Label the axes
0 1	Select an appropriate scale for the y-axis
0 1	Think about whether or not using a break is appropriate
0 1	Choose two colors to represent the two types of bars
0 1	Plan the spacing of the bars for the data. The data for each category should touch and a space is inserted between each new category
0 1	Use the Travel Expenses chart to create the bars
0 1	Create a key
	TOTAL Score

8 - 7 Excellent **6 - 5 Satisfactory** **4 - 0 Unsatisfactory**

***Also see graph.**


Field Trip Costs
500
450
400
350
300
250
200
150
100
50
0
Dollar Amount
Tour Guide
Fuel
Hotel
Expense Categories
Philadelphia
Washington, D

Scoring Tool for Proposal

Editing Criteria for Field Trip Proposal	
Score	**Criteria**
3 2 1 0	Uses correct format
3 2 1 0	Addresses the appropriate audience
3 2 1 0	Uses Math vocabulary
3 2 1 0	Clearly identifies the field trip choice
3 2 1 0	Gives clear reasons for choice based on data
3 2 1 0	CUPS
	TOTAL Score